

What is claimed is:

1. A method for forming a memory device, comprising:

provide a memory substrate including a substrate, a memory cell area, a peripheral circuit area, a first dielectric layer and a first metal layer, wherein the memory cell area and the peripheral circuit area are formed on the substrate, the first dielectric layer is formed on the memory cell area and the peripheral circuit area, and the first metal layer is formed on the first dielectric layer;

depositing an insulating layer on the first metal layer and the first dielectric layer not covered with the first metal layer;

depositing a shielding metal layer on the insulating layer;

etching the insulating layer and the shielding metal layer, so as to remove the insulating layer and the shielding metal layer over the first metal layer, and the shielding metal layer over the peripheral circuit area;

forming a second dielectric layer on the shielding metal layer, the insulating layer not covered with the shielding metal layer, and the first metal layer not covered with the shielding metal layer and the insulating layer; and

forming a second metal layer on the second dielectric layer.

2. The method as in claim 1, wherein the first dielectric layer is an inter-layer dielectric layer (ILD).

3. The method as in claim 1, wherein the second dielectric layer is an inter-metal

dielectric layer (IMD).

4. The method as in claim 1, wherein the first metal layer is electrically connected to the memory cell area and the peripheral circuit area through a plurality of contact holes formed in the first dielectric layer.

5. The method as in claim 1, wherein the second metal layer is electrically connected to the first metal layer through a plurality of contact holes formed in the second dielectric layer.

6. The method as in claim 1, wherein the step of etching the insulating layer and the shielding metal layer is by dry etching.

7. The method as in claim 1, wherein the shielding metal layer is formed by silicon nitride.

8. The method as in claim 1, wherein the shielding metal layer is formed by titanium nitride.

9. The method as in claim 1, wherein the shielding metal layer is formed by titanium.

10. The method as in claim 1, further comprising forming a spacer at sides of the first metal layer.

11. The method as in claim 10, further comprising forming a barrier layer over the first dielectric layer and under the first metal layer and the spacer.

12. The method as in claim 11, wherein the barrier layer is formed by titanium nitride.

13. The method as in claim 11, wherein the barrier layer is formed by titanium.